

IE 583 (IE523)
PRODUCTION SYSTEMS I

Fall 2007

INSTRUCTOR : **Dr. Ümit Bilge (M4025)**
SCHEDULE : **W 4 (M2181), F 2-3 (M1152)**

OBJECTIVES:

As the first of a two-course graduate-level series on Production Systems, this course focuses on the design of production systems. A wide range of design problems encountered in modern manufacturing environments are covered with particular emphasis on advanced quantitative modeling and solution techniques. In addition to the fundamental work in the area, some very recent additions to basic problem definitions and newer approaches will also be addressed through paper discussions.

COURSE CONTENTS:

1. Introduction	1 class
2. Facility Layout	10 classes
3. Group technology and cellular production systems	8 classes
4. Flexible Manufacturing Systems	6 classes
5. Facility Location: Continuous and discrete space models	9 classes
6. Distribution and logistic systems	3 classes

TEXTBOOK: Heragu, S. Facilities Design, PWS Publishing Company, 1997.

READING MATERIAL:

Singh, N., and Rajamani D., Cellular Manufacturing Systems: Design, Planning And Control, Chapman and Hall,1996.

Askin R.G., and Stanridge, C.R., Modeling and Analysis of Manufacturing Systems, John Wiley and Sons, 1993.

Francis, R.L., McGinnis, L.F., and White, J.A., Facility Layout and Location: An Analytical Approach, 2nd edition, Prentice Hall, 1992.

Groover, M.P., Automation, Production Systems, and Computer Integrated Manufacturing, Prentice Hall, 2001.

Singh, N., Computer-Integrated Design and Manufacturing, John Wiley and Sons, 1996.

GRADING:

Midterm : 25% November 12, Monday 17:00
Final : 35%
Presentation : 20
Mini-tests, discussions and attendance: 20%

IE 583 TENTATIVE SCHEDULE

Week	Date	Subject	Reading
1	26/9	Introduction	
		1 FACILITY LAYOUT	
	28/9	1.0 Basics for facility layout as prerequisite Mini-test 1 -Data requirements -Systematic layout planning -Basic algorithms and software	IE312 Lecture notes ,or IE503 lecture notes or Heragu, Ch.3 Heragu, Ch.4 Heragu, Ch.6
2	3/10	1.1. Models for the Layout Problem	Heragu , Ch.5
		1.1.1 Single Row Layout Problem	
	5/10	1.1.2 Multi-row Layout Problem	
3	10/10	1.2. Advanced Algorithms for the Layout Problem	Heragu, Ch.7
		1.2.1 Branch and Bound ¹	
	12/10	<i>Ramazan Bayramı</i>	
4	17/10	1.2.2 Bender's Decomposition Algorithm ²	Heragu, Ch.7
	19/10	1.2.3 Meta-heuristic algorithms ³	
		1.2.4 Graph theoretic approaches	
5	24/10	1.3. Next Generation Factory Layouts ⁴	
	26/10	2 CELLULAR MANUFACTURING SYSTEMS	
		2.0 Basics for GT as prerequisite Mini-test 2 -Defn.,Benefits, Classifications and coding, -Production flow analysis:ROC alg	IE312 Lecture notes ,or IE503 lecture notes or Heragu, Ch.8
		2.1 Cell formation using part machine matrix	Singh and Rajamani
6	31/10	2.2 Similarity coefficient based approaches	
	2/11	2.3 Mathematical programming methods	
		2.3.1 P-Median model	
		2.3.2 Assignment model	
7	7/11	2.3.3 Nonlinear model for simultaneous grouping	
	9/11	2.3.4 Multiple routings and capacity considerations ^{5,6}	
	12/11	Midterm	
8	14/11	3 FLEXIBLE MANUFACTURING SYSTEMS	
		3.1 The concept of flexibility and FMS design problems	Groover,Ch.16
	16/11	3.2 AGV flow path design ^{7,8}	Singh, Ch. 13
9	21/11	3.3 FMS Short-term design:FMS Loading Problem	
	23/11	FMS Loading Problem ^{9,10}	
10	28/11	4 FACILITY LOCATION	
		4.0 Basics for facility location as prerequisite Mini-test 3 -Single facility discrete and continuous space problems	IE312 Lecture notes ,or IE503 lecture notes or Heragu, Ch.13
	30/11	4.1 Advanced Facility Location Models	Heragu, Ch.14
		4.1.1 Multi-Facility Location Models	
		4.1.2 Location/Allocation Models	
		-Set covering problem	
11	5/12	- n-Median problem	
	7/12	-Warehouse location problem ¹¹	
12	12/12	-Capacitated L/A model ¹²	
	14/12	5 DISTRIBUTION AND LOGISTICS SYSTEMS	
		paper presentations ^{13,14}	
13	19/12	paper presentations ¹⁵	
	21/12	<i>Kurban Bayramı</i>	
14	26/12	paper presentations ¹⁶	
	28/12	paper presentations ^{17,18}	